Institute of Actuaries of India

Subject SA3 – General Insurance

November 2008 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable

1(A) Consider the impact upon claim frequency and claim amount. The impact will depend upon the proportion of claims that are between Rs.2,500 and the proposed new level of excess. This could be derived from past data of claim amount distributions.

If all claims are for an amount above the new excess, the average claim size will fall by an amount equal to the difference between the proposed and current excess.

Since some claims are less than the proposed excess, the reduction in risk premium will be slightly less than this.

The allowance for expenses should be considered. This is partly due to loadings being a percentage of premium and partly as a result of claim expense savings.

Consider how policyholders' behaviour might change as a result of introducing the excess. For example, the policyholders with losses in the border line might inflate claims if an excess is applied.

The average sum insured or target market might change if the excess is increased significantly.

Consider the impact upon volumes. Will sales fall (due to the higher excess) or will volumes rise, due to cheaper premiums? And the consequent effect on fixed expense loadings.

This will depend upon the price sensitivity of the market and also competition. This also leads on to how much we need to reduce the premium by, if we increase the excess.

1(B) Exclusions are used to avoid payment by the insurer in situations where the policyholder is at an advantage through possessing greater personal information about the likelihood of a claim. Without exclusion, there would be (moral hazard) a very high probability of a claim or that the risk could not be reasonably estimated.

To avoid accumulations of high severity events e.g. terrorism, war risks

Management attitude to risk; e.g. some diseases may require a prolonged medical treatment and may be expensive

To make rates more attractive e.g. excesses

To reduce impact of moral hazard; e.g. by introducing a new exclusion clause of certain diseases due to pre-existing conditions in the first 3 months reduces the risk of a policyholder taking policy just before getting the treatment.

To exclude cover for events where probability of loss is highly uncertain e.g. terrorism

To exclude cover for certain causes where probability of loss is very high e.g. dangerous sports

To be in line with the market e.g. to avoid anti-selection

To avoid expenses associated with large number of small claims e.g. Rs. 2,500

1(C) There may be a period of time before the condition to develop e.g. diseases like asbestos.

Occurrence of insured event; e.g. discovery of an illness in medical insurance.

Claim reported to the insurer or to a TPA (Third Party Administrator).

Claim processed by the insurer; depending on the type of claim (e.g. injury), a period of time may be allowed for any medical conditions to improve/settle.

Claims accepted by the insurer and any disagreements in respect of the amount to be paid are sorted out.

In some cases, disputes may result in lengthy court proceedings.

Partial payments and outstanding estimates or cashless in case of TPA.

Claims settled and file closed.

Claim reopened if conditions reappear.

1(D) Are there any changes in the claim handling team? This may affect the settlement delay patterns and the efficiency levels e.g. internal claims handling vs. appointment of TPAs or changes in TPAs.

Are there any changes in the type of claims? Different types of claims may have different features which affect the handling time; e.g. are there large differences in the type of claims that arose from Oct 2006 virus diseases compared to other claims.

Were there any external factors like postal strike, legislation, judicial or economic?
Were there any internal factors like staff shortage or system changes or system breakdown?
Investigate also:

- Change in cover
- Change of brokers
- Change in mix of business or cover – increased excess so change in size of claim

1(E) Assume that:

- Business is written evenly through the year.
- All the policies underwritten are annual.
- The predecessor's estimates are correct.

Assumption relating to how 5% change in premium applies.

Implies earned premium in year to 31 March 2008 = Rs. 250 lacs + Rs. 250 lacs/1.05 = Rs. 488.10 lacs.

Similarly, earned premium for other accident periods ending 31 March are:

2002: Rs. $488.10/(1.05)^6$ = Rs. 364.22 lacs;
2003: Rs. $488.10/(1.05)^5$ = Rs. 382.44 lacs;
2004: Rs. $488.10/(1.05)^4$ = Rs. 401.56 lacs;
2005: Rs. $488.10/(1.05)^3$ = Rs. 421.64 lacs;
2006: Rs. $488.10/(1.05)^2$ = Rs. 442.72 lacs;
2007: Rs. $488.10/(1.05)$ = Rs. 464.86 lacs;

Similarly, earned acquisition expenses for accident years ending 31 March are:

2002: Rs. 364.22 × 0.03 = Rs. 10.93 lacs;
2003: Rs. 382.44 × 0.03 = Rs. 11.47 lacs;
2004: Rs. 401.56 × 0.03 = Rs. 12.05 lacs;
2005: Rs. 421.64 × 0.03 = Rs. 12.65 lacs;
2006: Rs. 442.72 × 0.03 = Rs. 13.28 lacs;
2007: Rs. 464.86 × 0.03 = Rs. 13.95 lacs;

2008: Rs. 488.10 × 0.03 = Rs. 14.64 lacs;

Assume that:

- Accident Year 2002 is fully developed.

Future claims settlements will be similar to the past experience.

Year Ending 31 Mar /DevmtYear	0	1	2	3	4	5
2002	**303.40**	**364.08**	**363.44**	**361.44**	**356.94**	356.94
2003	321.82	386.18	385.11	383.11	380.81	
2004	348.15	417.78	416.09	414.09		
2005	390.64	468.77	466.08			
2006	297.28	356.74				
2007	396.34					
LDF	1.200	0.996	0.995	0.991	1.000	
CDF	1.179	0.982	0.986	0.991	1.000	

Year Ending 31 Mar	GEP	ReptdIncd	CDF	CL-Ult	LR
2002	364.22	356.94	1.000	356.94	98.0%

2003		382.44	380.81	1.000	380.81	99.6%
2004		401.56	414.09	0.991	410.31	102.2%
2005		421.64	466.08	0.986	459.45	109.0%
	2006	442.72	356.74	0.982	350.35	79.1%
	2007	464.85	396.34	1.179	467.09	100.5%

Need to adjust the claims incurred for inflation, any increase in claim frequency and for the impact due to disease.

Up to and including 2005 can be taken at face value as there are no known mitigating factors, other than random variation.

Claims incurred from 2006 onwards need to be adjusted to put them on a constant cover basis.

Aside from the change to cover, assume the same levels of exposure are covered each year (i.e. assume no other changes).

Assume mix of business unchanged following changes in cover.

Changes to cover came in July 2006 and is expected to reduce the claims cost by 15% overall. However, changes in cover to exclusions within the first 3 months brought in before the likely influx in claims due to virus, so potential impact of disease due to virus should be mitigated on a greater percentage of incurred claims. Say 8% (though anything up to, say, 15% may also be considered reasonable).

The defined claim event date will be significant.

This assumes that the incidence of disease claims increased significantly because of the virus in October 2006 – but after policy change came into force. Assume that the increase in claims due to the disease is 25%.

Implies claims incurred 2006 would have been $\{(1 / 0.75) \times 0.08 \times 350.35 + 0.92 \times 350.35\}/1.25$ = Rs. 287.75 lacs in the absence of any changes to the cover provided.

Likewise, some claims in 2007 will have originated from the original policy wording. So the impact may be assumed to affect 87.5% of claims.

However, the spread of virus in October 2006 will affect this assumption, with proportionately more claims likely to be affected by the change in cover. Say 95% (though anything from, say, 90% may also be considered reasonable). Any external data on the incidence rates and the durations of the illness to be examined before a decision on this.

Implies claims incurred 2007 would have been $\{(1 / 0.75) \times 0.95 \times 467.09 + 0.05 \times 467.09\}/1.25$ = Rs. 492.00 lacs in the absence of any changes to the cover provided.

Estimate for new claims incurred = average of all years based on constant (old) cover, reduced to new cover basis. Other reasonable approach like ignoring first 2 years may also be considered for giving marks.

However, also need to adjust for higher than average incurred in 2006/07 due to the spread of diseases from the virus.

By between 15% and 25%, judging by the numbers given – say 20%

$= 0.75 \times [(356.94 \times 1.10^6 + 380.81 \times 1.10^5 + 410.31 \times 1.10^4 + 459.45 \times 1.10^3 + 287.75 \times 1.10^2 + 492.00 \times 1.10]/6$

= Rs. 418.41 lacs. (or alternative sensible calculation based on past results)

Expected loss ratio = incurred claims / earned premiums = 418.41 / 488.1 = 0.857

Year ending 31 March	GWP	GEP	Claims Incurred	Acquisition Costs (3% of GEP)	Operating Expenses (12% of GEP)	Claims Handling (3% of Claims Incurred)	Total of Claims & Expenses	Loss Ratio	Combined Ratio
2002	373.11	364.22	356.94	10.93	43.71	10.71	422.28	98.0%	115.9%

2003	391.76	382.44	380.81	11.47	45.89	11.42	449.60	99.6%	117.6%
2004	411.35	401.56	410.31	12.05	48.19	12.31	482.85	102.2%	120.2%
2005	431.92	421.64	459.45	12.65	50.60	13.78	536.47	109.0%	127.2%
2006	453.51	442.72	350.35	13.28	53.13	10.51	427.27	79.1%	96.5%
2007	476.19	464.85	467.09	13.95	55.78	14.01	550.83	100.5%	118.5%
2008	500.00	488.10	418.41	14.64	58.57	12.55	504.18	85.7%	103.3%

1(F)   **Difference in experience:**

The primary risk for private medical insurance is the health of the insured.

Teachers are likely to have a healthier lifestyle whilst the staff of large industrial company may be exposed to production processes, etc. depending on the industry.

Depending on the industry, the staff of large industrial company may have above normal claims from lung diseases, etc. whilst Teachers may have worse claims experience due to infections, virus/bacterial diseases spread from the students.

The experience of Teachers and the staff of large industrial company may be subject to seasonality of claims depending on their location e.g. higher incidence of asthma during winter months.

The type of cover (hospital group) and the extent of cover (excess, limits, etc.) may be different from the general offering.

These group insurance policies may have fewer rating factors and exclusions as for individual policies because the possibility of anti-selection will be reduced substantially.

For large group schemes, whether membership is optional or compulsory could make a material difference to the claims experience and hence the premium rates.

Adjusting the premium rates:

Being large group insurance, own data may be used, if available.

Premium rates will also be adjusted for any reduction in expenses for these Group Schemes.

The premium rates may be adjusted either on the basis of experience or exposure rating. Because the insurance company is entering this market, the availability of data to the insurer is limited unless there is access to the earlier experience of that insured from the former insurer. Therefore, experience-rating is more likely to be used.

The experience rating may be either number-based (NCD) or cost-based. NCD may be unlikely because the cost of claims is likely to be large and variable in case of medical insurance (hospitalisation, costs of treatment, etc.)

The experience-rating can be done either prospectively or retrospectively; because the insurer is entering this market, retrospective basis is the less risky option to the insurer.

If the aggregate experience per-person year is A and the risk premium based on the insured's own experience is E, the premium can be derived using the formula:

Premium = Z.A + (1-Z).E, where Z is the credibility factor, which increases between 0 and 1 according to the size of the risk.

The value of Z can be determined based on various approaches based number of claims, claim amounts or exposure. One such example is:

Ratio of number of person-years from the Group Scheme to the total person-years of the Total.

[50]

2(A)   Answer:

Risk Characteristics:

Policies cover losses arising from incidents occurring during holidays or periods of business travel or from the expense involved in cancelling travel arrangements for certain specific reasons (e.g. illness or bereavement).

The main risks arise from:
 (a) Destination (some destinations may be politically unstable and medical/legal expenses)
 (b) Type of holidays (certain sporting holidays like skiing may be riskier)
 (c) Age, Number and Gender in the party (older travellers)
 (d) Current health of the party
 (e) Reason for travel (business or leisure)
 (f) Duration of travel
 (g) Level of cover
 (h) Claims are usually reported and settled quickly; there may be few large liability or medical expenses claims which can take longer.
 (i) Prone to the seasonality (summer holidays)
 (j) Large accumulations of risk (cover provided to a particular tour operator)

Prone to the economic climate (e.g. during the current economic meltdown couples with high oil prices, several tour operators and airlines filed for bankruptcy leading to a large no. of travel insurance claims)

Product Features Required:

Travel medical insurance covers the following risks:
 - Cancellation
 - Expenses of delay
 - Costs of emergency medical treatment
 - Repatriation due to sickness/accident
 - Personal effects and money
 - Personal accident and liability
 - Loss of passport, driving licence, etc.

Compensation for Cancellation is a fixed sum; the exposure period is from the inception of the policy to the date of travel.

Typical exclusions (for reasons listed above) are:
 - Certain foreign destinations
 - Accident benefits/medical expenses resulting from drugs, attempted suicide, dangerous sports

There may be a small excess on some/all sections of the policy e.g. loss of luggage.

Product Distribution:

They might be
 - direct (internet or telephone),
 - brokers,
 - travel agents,
 - linked with credit cards / bank accounts or

vending machines at the airports/train stations.

Pricing Methodology:

Travel insurance policies are usually purchased off-the-shelf through travel agents. Premium rating is therefore driven by practical considerations.

Need data in order to model the appropriate risk premiums.

Need information in order to estimate various expenses.

Need to establish required return on capital / profit.

What contingency margin is required for adverse experience?

Cost of reinsurance.

Premium rates are determined from the past experience of the publicly available data or data from large tour operators.

Experience of the other companies and the current market trends may also help determining the premium.

Exposure measure is person-journey or person-week. The usual rating factors are:
- Destination
- Level of cover
- Age
- Duration of travel
- Purpose of travel
- Credit-Rating or Quality of the tour operator

Financial strategy

Must consider the company's role & purpose, and the main aims of the company.

5-year projections will be needed to ensure proposal has a sound financial basis, including sensitivity test.

Financial and Business Objectives.

Key measurable targets detailed, against which success of financial strategy can be measured.

E.g. with regard to market share, profitability, financial strength, etc.

SWOT and Business Risk Analysis.

Reinsurance arrangements must be considered in order to ensure exposure is suitably controlled to this new class of business.

Income and Expenditure forecasts / projected profit and loss account

Does the company have required spare capital to cover any expenses on the additional infrastructure and the need for product development/ initial reserves with which to venture into new areas?

Are there any solvency issues that may limit the entry?

Are there any cash flow requirement issues?

Difference from the existing portfolios:
- Short-term contracts – less than a year
- Seasonality of business e.g. holiday seasons
- May be governed by the laws of other foreign countries
- May be subject to political risks of other foreign countries
- Subject to currency fluctuations; may have to pay claims in overseas currencies

2(B)   **Capital considerations:**

Required minimum levels of solvency margin as per IRDA regulations.

The company may wish to hold more prudent capital than the minimum levels of capital to meet fluctuations in claim or other experience. If the company is capitalised to lower levels may trigger unwanted regulatory intervention.

Consider changes to the regulation in the future e.g. changes to the required levels of solvency margin.

How does this compare to the competitors; this may have implications on the market confidence.

The credit rating of the company will depend on the available capital.

The availability of capital may impact the ability to raise additional capital.

Do potential policyholders/brokers and investors require a certain level of capital or credit rating to place the business?

Holding additional capital will provide extra flexibility to the management e.g. investment policy.

Need to consider potential alternatives to this course of action.

Are there more profitable areas for expansion?

Opportunity costs of different reinsurance arrangements vs. capital requirements.

Given the expectation of reduction in rates, any current levels of the return on capital may not be sustainable.

Costs of entering the travel insurance market – market promotion, setting up systems, processes, etc.

2(C) As at 31 March 2008,

	Motor	Fire	Miscellaneous	Total
As at 2008 (Lacs of Rupees)				
Gross Written Premium	40,000	55,000	25,000	120,000
Net Written Premium	21,000	27,500	18,000	66,500
Ratio of NWP/GWP	52.5%	50.0%	72.0%	
Gross Earned Premium	32,500	47,500	12,500	92,500
Net Earned Premium	17,063	23,750	9,000	49,813
Ratio of NEP/GEP	52.5%	50.0%	72.0%	
Ratio of GEP/GWP	81.3%	86.4%	50.0%	77.1%
Gross Claims Paid	13,000	25,500	3,500	42,000
Net Claims Paid	6,825	12,750	2,520	22,095
Ratio of Net/Gross Claims Paid	52.5%	50.0%	72.0%	
Gross Claims Outstanding	15,000	22,750	5,250	43,000
Net Claims Outstanding	7,875	11,375	3,780	23,030
Ratio of Net/Gross Claims Outstanding	52.5%	50.0%	72.0%	
Gross Claims Incurred	28,000	48,250	8,750	85,000
Net Claims Incurred	14,700	24,125	6,300	45,125
Ratio of Net/Gross Claims Incurred	52.5%	50.0%	72.0%	
Gross Loss Ratio	86.2%	101.6%	70.0%	91.9%
Net Loss Ratio	86.2%	101.6%	70.0%	90.6%
Factor A	0.85	0.50	0.70	
Factor B	0.85	0.50	0.70	
GEP x Factor A	27,625	23,750	8,750	60,125
NEP	17,063	23,750	9,000	49,813
RSM (1)	5,525	4,750	1,800	12,075
Gross Incurred x Factor B	23,800	24,125	6,125	54,050
Net Incurred	14,700	24,125	6,300	45,125
RSM (2)	7,140	7,238	1,890	16,268
RSM	7,140	7,238	1,890	16,268

The company has quota share reinsurance for all classes of business (the ratio of net-to-gross is the same on both premiums and claims).

2(C) Assume that:

Rate reductions apply only to the following year and remain constant in the following 2 years.
Policies are written and earning patterns are the same.
Same levels of reinsurance Quota Share on all classes of business.
Accident Year loss ratios have been maintained through risk selection and claims management.

	As at 2009 (Lacs of Rupees)			
	Motor	Fire	Miscellaneous	Total
Gross Written Premium	40,000	48,125	28,125	116,250
Net Written Premium	21,000	24,063	20,250	65,313
Ratio of NWP/GWP	52.5%	50.0%	72.0%	
Gross Earned Premium	32,500	41,563	14,063	88,125
Net Earned Premium	17,063	20,781	10,125	47,969
Ratio of NEP/GEP	52.5%	50.0%	72.0%	
Ratio of GEP/GWP	81.3%	86.4%	50.0%	75.8%
Gross Claims Incurred	28,000	42,219	9,844	80,063
Net Claims Incurred	14,700	21,109	7,088	42,897
Ratio of Net/Gross Claims Incurred	52.5%	50.0%	72.0%	
Gross Loss Ratio	86.2%	101.6%	70.0%	90.9%
Net Loss Ratio	86.2%	101.6%	70.0%	89.4%
Factor A	0.85	0.50	0.70	
Factor B	0.85	0.50	0.70	
GEP x Factor A	27,625	20,781	9,844	58,250
NEP	17,063	20,781	10,125	47,969
RSM (1)	5,525	4,156	2,025	11,706
Gross Incurred x Factor B	23,800	21,109	6,891	51,800
Net Incurred	14,700	21,109	7,088	42,897
RSM (2)	7,140	6,333	2,126	15,599
RSM	7,140	6,333	2,126	15,599

Assume also that Travel Medical Business is written uniformly throughout the year.

	As at 2010 (Lacs of Rupees)				
	Motor	Fire	Miscellaneous	Travel Medical	Total
Gross Written Premium	50,000	60,156	35,156	2,530	147,843
Net Written Premium	26,250	30,078	25,313	1,139	82,779
Ratio of NWP/GWP	52.5%	50.0%	72.0%	45.0%	
Gross Earned Premium	40,625	51,953	17,578	1,265	111,421
Net Earned Premium	21,328	25,977	12,656	569	60,530
Ratio of NEP/GEP	52.5%	50.0%	72.0%	45.0%	
Ratio of GEP/GWP	81.3%	86.4%	50.0%	50.0%	75.4%
Gross Claims Incurred	35,000	52,773	12,305	696	100,774
Net Claims Incurred	18,375	26,387	8,859	313	53,934
Ratio of Net/Gross Claims Incurred	52.5%	50.0%	72.0%	45.0%	
Gross Loss Ratio	86.2%	101.6%	70.0%	55.0%	90.9%
Net Loss Ratio	86.2%	101.6%	70.0%	55.0%	89.4%
Factor A	0.85	0.50	0.70	0.70	
Factor B	0.85	0.50	0.70	0.70	
GEP x Factor A	42,500	30,078	24,609	1,771	98,959
NEP	26,250	30,078	25,313	1,139	82,779
RSM (1)	8,500	6,016	5,063	1,771	21,349
Gross Incurred x Factor B	29,750	26,387	8,613	487	65,237
Net Incurred	18,375	26,387	8,859	313	53,934
RSM (2)	8,925	7,916	2,658	487	19,986
RSM	8,925	7,916	5,063	1,771	23,675

	As at 2011 (Lacs of Rupees)				
	Motor	Fire	Miscellaneous	Travel Medical	Total
Gross Written Premium	62,500	75,195	43,945	2,910	184,550
Net Written Premium	32,813	37,598	31,641	1,309	103,360
Ratio of NWP/GWP	52.5%	50.0%	72.0%	75.0%	
Gross Earned Premium	50,781	64,941	21,973	2,720	140,415
Net Earned Premium	26,660	32,471	15,820	1,224	76,175
Ratio of NEP/GEP	52.5%	50.0%	72.0%	45.0%	
Ratio of GEP/GWP	81.3%	86.4%	50.0%	93.5%	76.1%
Gross Claims Incurred	43,750	65,967	15,381	1,496	126,594

Net Claims Incurred	22,969	32,983	11,074	673	67,700
Ratio of Net/Gross Claims Incurred	52.5%	50.0%	72.0%	45.0%	
Gross Loss Ratio	86.2%	101.6%	70.0%	55.0%	90.9%
Net Loss Ratio	86.2%	101.6%	70.0%	55.0%	89.4%
Factor A	0.85	0.50	0.70	0.70	
Factor B	0.85	0.50	0.70	0.70	
GEP x Factor A	53,125	37,598	30,762	2,037	123,521
NEP	32,813	37,598	31,641	1,309	103,360
RSM (1)	10,625	7,520	6,328	2,037	26,509
Gross Incurred x Factor B	37,188	32,983	10,767	1,047	81,985
Net Incurred	22,969	32,983	11,074	673	67,700
RSM (2)	11,156	9,895	3,322	1,047	25,421
RSM	11,156	9,895	6,328	2,037	29,416

[50]

****